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| WELLS ST. JOHN P.S. 601 W. FIRST AVENUE, SUITE 1300 SPOKANE, WA 99201 | | | CHAUDHRY, SAEED T | |
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1746

DATE MAILED: 07/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/636,028

Applicant(s)

BASCERI ET AL.

Examiner

Saeed T. Chaudhry

Art Unit

1746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 May 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on May 8, 2006 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 148 USPQ 459, that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or unobviousness.

Claims 1-4, 6-16, and 18-23 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Chen et al in view of Cotte et al.

Chen et al (5,356,478) disclose a method for removing residues previously formed in a plasma chamber by dry etching layers such as photoresist, barriers, etc. It is conventional to dry etch a stack of thin layers which can include photoresist (for patterning the underlying layers), an anti-reflective coating, aluminum, and a barrier material. Such etching, however, results in residues or deposits building up on surfaces inside the plasma treatment chamber 9see abstract

Art Unit: 1746

and col. 1, lines 11-37). Chen et al fails to use supercritical fluid for cleaning the residue from the walls of the chamber.

Cotte et al (6,454,869) disclose a method of removing organic material from a surface of semiconductor manufacturing equipment. A semiconductor processing, handling and manufacturing equipment 16 to be cleaned is introduced into a cleaning zone 14 of a processing chamber 12 wherein the equipment 16 is exposed to liquid carbon dioxide or supercritical carbon dioxide. To ensure that the liquid carbon dioxide and supercritical carbon dioxide remains in the liquid or supercritical state during processing, the processing chamber 12 is maintained at a pressure in the range of between about 1,000 psi and about 6,000 psi. The temperature within processing chamber 12 is maintained in a range of between about 40.degree. C. and about 100.degree. C. (see col. 2, lines 37-57).

Liquid or supercritical carbon dioxide is provided into processing chamber 12 by means of a liquid or supercritical carbon dioxide source 30 (see col. 2, lines 66-67). The semiconductor processing, handling and manufacturing equipment 16 to be cleaned in accordance with the present invention, as stated above, is introduced into sample zone 14 of the chamber 12 wherein it is exposed to liquid or supercritical carbon dioxide (see col. 3, lines 19-23).

As those skilled in the art are aware, coating of semiconductor wafers with photoresists is a critical processing step in the formation of semiconductor chips. Typically, a photoresist is cast upon semiconductor wafers while the wafers are rotated to provide a uniform coating thereupon. Such turntable assemblies are schematically represented at 44 in FIG. 4. Obviously, these assemblies are contacted with photoresist residue which falls off wafers during application.

Art Unit: 1746

As such, they are ideal candidates for cleaning in accordance with the process of the present invention (see col. 3, lines 44-56).

A photoresist may be better processed when the liquid or supercritical carbon dioxide contacts the photoresist in the presence of a surfactant. Thus, in a preferred embodiment of the present invention, the cleaning agent is a liquid or supercritical carbon dioxide composition which includes a surfactant (see col. 3, lines 60-65).

The composition employed in the process of the invention can, in addition to supercritical or liquid carbon dioxide and a surfactant, include a further component, a co-solvent (see col. 4, lines 58-60).

It would have been obvious at the time applicant invented the claimed process to incorporate the cited steps of introducing a supercritical fluid such as carbon dioxide composition as disclosed by Cotte et al into the process of Chen et al for purpose of removing residue such as photoresist from the internal surfaces of the chamber. This is because Chen et al disclose that it is conventional to remove residue or build up on surfaces inside the plasma treatment chamber. Further, one of ordinary skill in the art would utilize supercritical fluid for effectively removing the residue such as photoresist from the inside of the chamber, since Cotte et al disclose that photoresist is effectively removed by contacting with liquid or supercritical carbon dioxide.

Further Cotte et al disclose to remove organic or inorganic residue from the surfaces with supercritical fluid such as carbon dioxide. Therefore, one of ordinary skill in the art would expect that the residues as claimed in claim 2 and residue from the trap or dispenser will be removed by the supercritical fluid.

Art Unit: 1746

Claim 5 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Chen et al in view of Cotte et al as applied to claim 1 above, and further in view of Goffnett et al.

Chen et al and Cotte et al were discussed supra. However, the reference fails to disclose that the processing chamber is selected from the group of a CVD chamber.

Goffnett et al (5,108,512) disclose a method for removing inner surface of a CVD chamber with pellets of carbon dioxide (see claims).

It would have been obvious at the time applicant invented the claimed process to clean a CVD chamber with the process of Cotte et al because it is known in the art to clean a CVD chamber as disclosed by Goffnett et al and one would expect that supercritical fluid would remove the residue in the CVD chamber because Cotte et al disclose to remove organic and inorganic residues.

Claims 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al in view of Cotte et al as applied to claim 1 above, and further in view of Smith, Jr. et al.

Chen et al and Cotte et al were discussed supra. However, the reference fails to treat the surface with solvent before the treatment with supercritical fluid.

Smith, Jr. et al (5,417,768) disclose to remove residue from a surface by treating with a primary solvent and then flushing the solvent from the vessel and supplying carbon dioxide at supercritical conditions (see col. 5, lines 49-51 and claims).

It would have been obvious at the time applicant invented the claimed process to pre-treat the surface with a solvent as disclosed by Smith, Jr. et al into the processes of Jackson et al or Cotte et al to enhance the cleaning effect.

Response to Applicant's Arguments

Art Unit: 1746

Applicant argued that the combination of Chen et al and Cotte et al fail to disclose or suggest the claim 1 recited removing residue material from over at least one internal chamber surface utilizing supercritical fluid in the processing chamber. Applicant notes that the Chen et al disclosure specifically indicates cleaning various chamber surfaces utilizing plasma treatment and indicates complete removal by such technique. Accordingly, such reference does not provide motivation for modification.

This argument is not persuasive because it is well known in the art to cleaning processing chamber after performing process step on a material as disclosed by Chen et al. Cotte et al disclose to clean semiconductor processing , handling and manufacturing equipment by contacting with carbon dioxide in the liquid or supercritical state, a surfactant and a co-solvent. Therefore, one of ordinary skill in the art would utilize the process of Cotte et al to clean the inside of a processing chamber. The applicant argued that there is not motivation in the Chen et al process to include another process step as disclosed by Cotte et al. This is not persuasive because Chen et al is cited to disclose that it is known in the art that the process chambers are cleaned after the treatment to a product in the processing chamber and one of ordinary skill in the art would utilize also the teaching of Cotte et al to remove residues from the chamber too, since the applicant has not shown any unexpected results which are not disclosed by Chen et al or Cotte et al.

For a finding of obviousness within the meaning of 103, the references themselves need not explicitly suggest the combination of their features where all the references pertain to the same field of endeavor. The test is what the combined teachings of the references, taken collectively would have suggested to one of ordinary skill in the art (see Cable elec. Prods., Inc.

Art Unit: 1746

V. Genmark, Inc., 770 F.2d 1015, 1025, 226 USPQ 881, 886-87 (Fed. Cir. 1985 and In re Keller, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981)).

Applicant argued that the court has indicated that the factual question of motivation is material to patentability and cannot be resolved on subjective belief and unknown authority and stated that deficiencies of cited references cannot be remedied by general conclusions about what is basic knowledge or common sense but must be based on evidence. In the instant case the record is void of any evidence to support motivation to modify the techniques of processing chamber to remove residue material by contacting the residue material over at least one or more process event conducted within the processing chamber.

This argument is not persuasive because Cotte et al disclosed to use supercritical fluid to remove material from a surface. Therefore, one of ordinary skill in the art would use supercritical fluid to remove material from the surface of a processing chamber since the surfaces are not materially different and one would expect to have same results as disclosed by Cotte et al.

Applicant argued that Smith disclosure such also discloses placement of work pieces to be cleaned within a vessel specially designed for particular cleaning purpose. When considered in combination with Cotte et al and Chen et al , the Smith disclosure of cleaning objects within a vessel particularly configured to such cleaning fails to contribute toward suggesting the claim 1 recited cleaning residue or material from internal surfaces of a processing chamber.

This argument is not persuasive because Smith is cited to show that it is known in the art to use solvent before using supercritical fluid to enhance the cleaning effect as claimed in claim 17, since multiple cleaning steps are known to increase the cleaning effect.

Art Unit: 1746

The applicant argued that Goffnett et al do not contribute towards suggesting the claim 1 recited cleaning processing chamber surfaces utilizing a supercritical fluid to remove residue from surfaces where the residue was deposited during one or more processing event conducted within the processing chamber.

This argument is unpersuasive because Goffnett et al cited to disclose that it is known in the art to clean a CVD chamber as claimed in claim 5.

Applicant's arguments filed May 8, 2006 have been fully considered but they are not persuasive.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Saeed T. Chaudhry whose telephone number is (571) 272-1298. The examiner can normally be reached on Monday-Friday from 9:30 A.M. to 4:00 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Michael Barr, can be reached on (571)-272-1414. The fax phone number for non-final is (703)-872-9306.

When filing a FAX in Gp 1700, please indicate in the Header (upper right) "Official" for papers that are to be entered into the file, and "Unofficial" for draft documents and other communication with the PTO that are for entry into the file of the application. This will expedite processing of your papers.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (571) 272-1700.

Saeed T. Chaudhry
Patent Examiner



MICHAEL BARR
SUPERVISORY PATENT EXAMINER